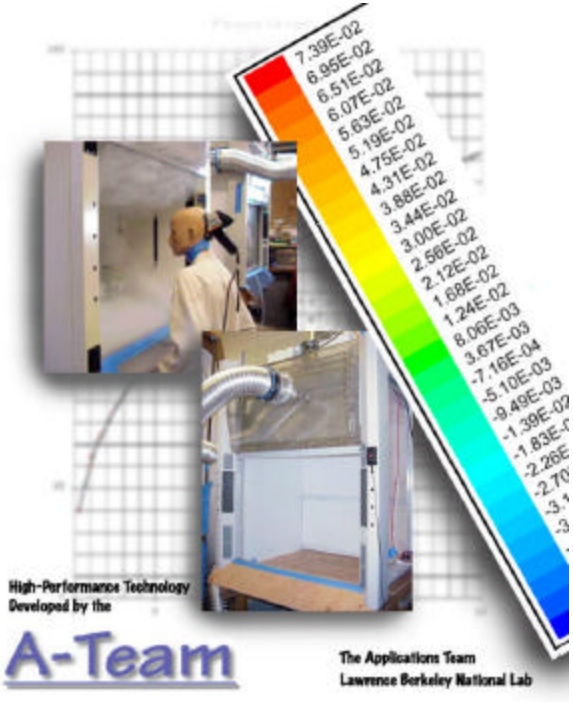
Lawrence Berkeley National Laboratory's
High Performance Fume Hood



Presented by: Geoffrey C. Bell, PE

Berkeley Lab's
High Performance Fume Hood

Thanks to…

LBNL funded by the following organizations:

Pacific Gas and Electric

U.S. Department of Energy

California Energy Commission

California Institute for Energy Efficiency

Berkeley Lab's
High Performance Fume Hood

And special thanks to…

LBNL partnered with the following:

University of California, San Francisco

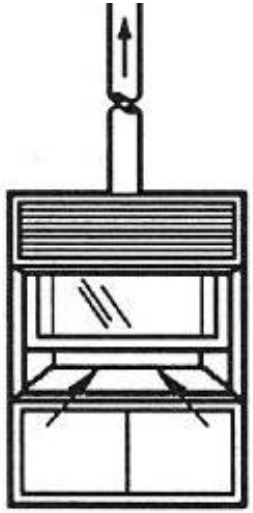
Labconco

Siemens Controls

Marina Mechanical

Berkeley Lab's
High Performance Fume Hood

Standard Fume Hood Designs



Exhaust system induces airflow through hood.

Airflow through hood's open sash is ~100 FPM

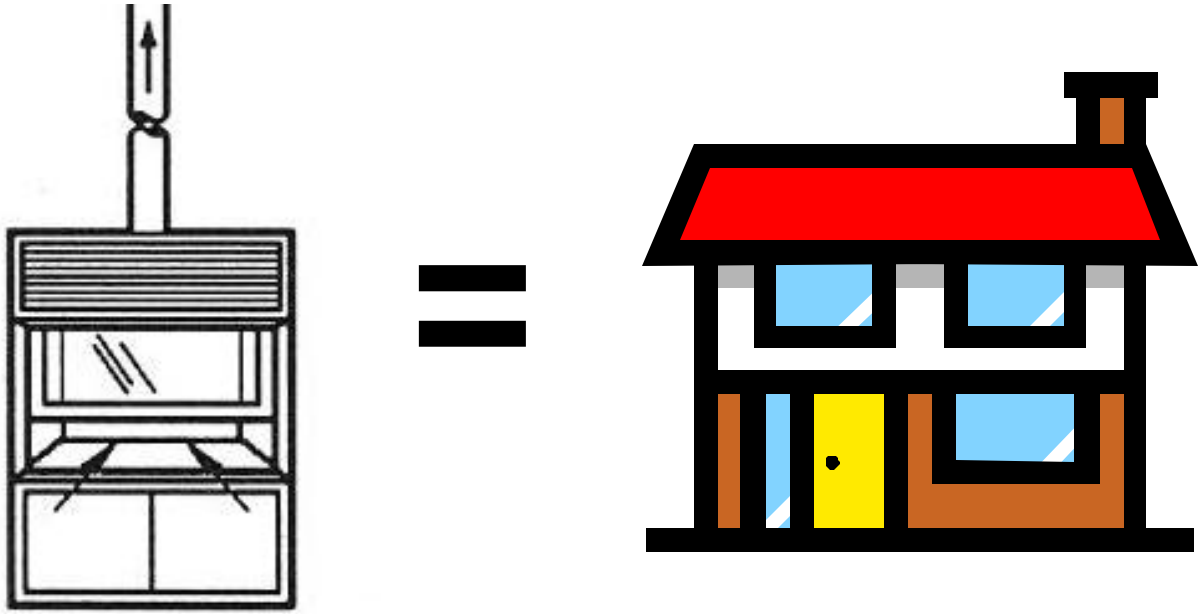
Supply air must "make up" combined hood exhaust

Consequently, large air volumes are conditioned and expelled from laboratories 24/7

Fume hoods *typically* "drive" system sizing

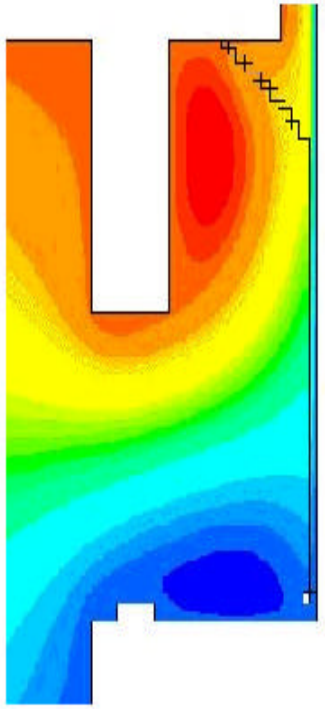
Berkeley Lab's
High Performance Fume Hood

Fume Hood Energy Consumption



Berkeley Lab's
High Performance Fume Hood

Fume Hood Airflow Modeling



Two-dimensional airflow visualization provided with Computational Fluid Dynamic (CFD) models.

CFD Modeling used for large changes to design.

Fine tuning design accomplished empirically.

Berkeley Lab's
High Performance Fume Hood

Air Divider Technique

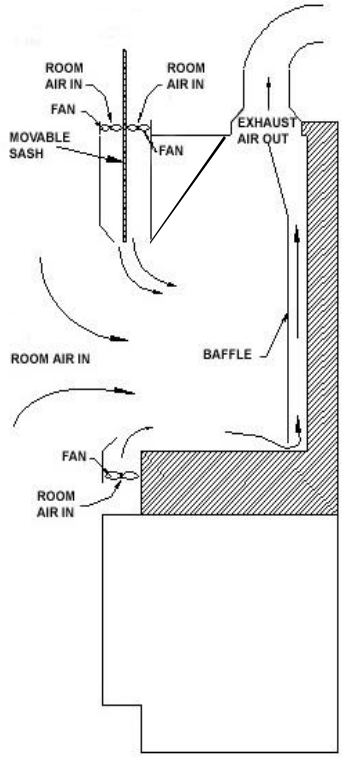
(Sectional view)

Low-turbulence Intensity

Displacement ventilation

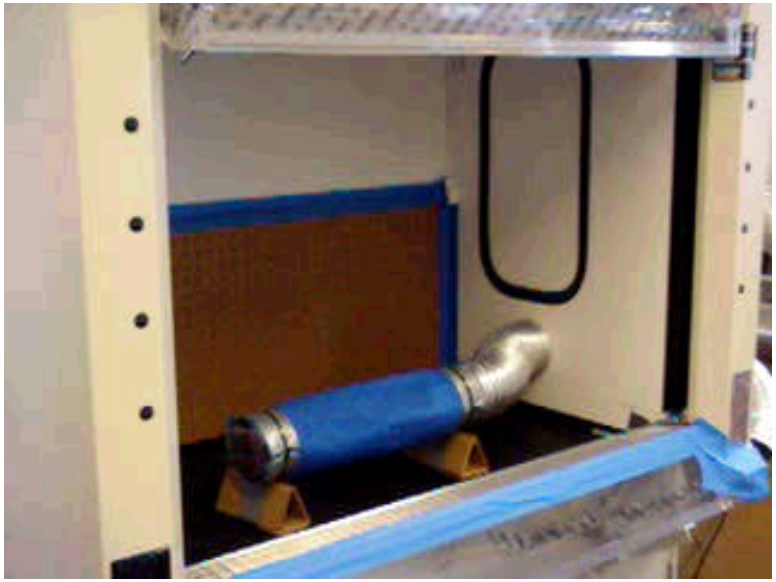
Push-Pull Containment

U.S. Patent# 6,089,970



Berkeley Lab's
High Performance Fume Hood

Progress so far...



Smoke visualization test at 30% "normal" flow

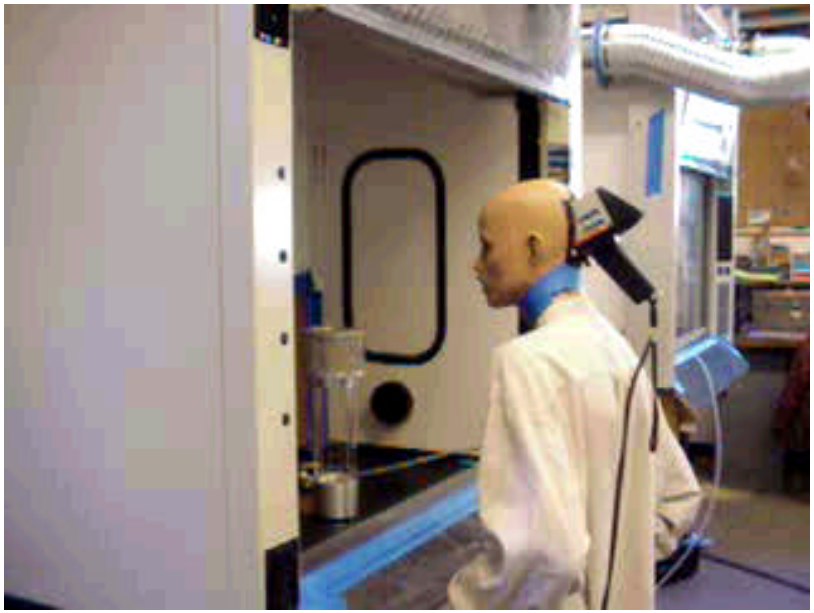
Berkeley Lab's
High Performance Fume Hood

Smoke in Supply Plenums…

Exhaust:
40% "normal" flow

Ejector:
8L/min.

Breathing Zone:
18 inches



Berkeley Lab's
High Performance Fume Hood

UCSF Field Test

Labconco Berkeley-hood Prototype

Berkeley Lab's
High Performance Fume Hood

UCSF Field Test

Labconco Berkeley-hood Prototype in use.

Berkeley Lab's
High Performance Fume Hood

Contact Us for More Information

http://ateam.lbl.gov

Geoffrey C. Bell
510.486.4626
gcbell@lbl.gov

Dale Sartor
510.486.5988
dasartor@lbl.gov